

THE MODEL ENGINEER



WEDNESDAY JAN 6 1949 9d.

The MODEL ENGINEER

PERCIVAL MARSHALL & CO. LTD., 23, GREAT QUEEN ST., LONDON, W.C.2

6TH JANUARY 1949



VOL. 100 NO. 2485

Smoke Rings	1
Concerning Models	3
"Rejuvenating Grandpa"	7
"Maid of Kent"—Pipe Connections for Outside Cylinders	10
A Locomotive Fire Door	14

A Miniature Two-stroke Diesel Engine	15
A Working Model Workshop	20
For the Bookshelf	22
Soft-soldering and the Model Engineer	23
Practical Letters	27
Club Announcements	29

SMOKE RINGS

Our Cover Picture

● THE MODEL of Tower Bridge was constructed for the Port of London Authority before the war for display on a stand, which they planned for the New Zealand Exhibition. It measured 10 ft. by 15 ft. and those familiar with Tower Bridge will see that it is accurate in every detail. Incidentally, it gives a good impression of the appearance of Tower Bridge before it became blackened by the London atmosphere.

Another Century!

● WITH THIS issue, THE MODEL ENGINEER begins its 100th volume, and we hope we may be excused if we confess to a feeling of pride in the achievement. We are proud to have inherited the responsibility for maintaining a standard which has built up a world-wide reputation for THE MODEL ENGINEER. The unique position which our journal holds in the model engineering world is entirely due to the work of the late Mr. Percival Marshall; until his death last year, we had comparatively little to do with it. Our concern is to maintain and develop the tradition which he established, to enhance the reputation he created and to ensure that THE MODEL ENGINEER does not fail in its purpose.

We are proud and grateful too, to acknowledge the friendly support and co-operation of readers

and contributors, which make our editorial duties so very pleasant. This happy relationship between ourselves and those we serve acts as an inspiration urging us to greater efforts, and so, with complete confidence, we begin the task of presenting THE MODEL ENGINEER's 100th volume.

Getting Together at Slough

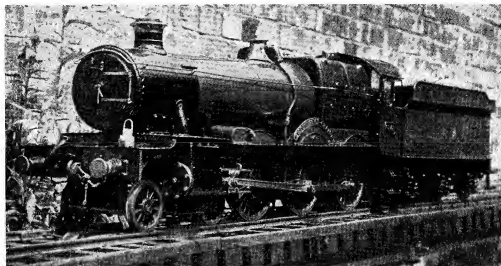
● THE SLOUGH and District Society of Model Engineers is making arrangements to hold what the Social Secretary, Mr. C. R. Hunt, calls a "Get-together" meeting. The date is fixed for Saturday, February 5th, 1949, and the venue will be the Aspro Hall, Trading Estate, Slough, Bucks. The meeting will begin at 2 p.m. and will continue until 10 p.m.

A cordial invitation is extended to any model engineering society that can arrange to be represented by a party of its members. Mr. Hunt states that, at the meeting, it is hoped to have an exhibition of members' work, the passenger-hauling track in operation, and "tea and a doughnut laid on." It is an excellent opportunity for the society to make new friends and to become known by other societies; we know the Slough fraternity to be enthusiastic, friendly and hospitable people, and we hope that this special meeting of theirs will meet with the desired success.

A 5-in. Gauge "Grange"

● THE PHOTOGRAPH reproduced on this page shows a 5-in. gauge version of the G.W.R. engine No. 6848, *Toddington Grange*, built by Mr. H. Richardson, of Cheltenham. The locomotive is to 1 $\frac{1}{4}$ -in. scale, which is correct for the gauge. The overall length is about 6 ft. 3 in., and the construction occupied some 2,000 hours spread over three years. The cylinders are 1 $\frac{1}{2}$ in. bore

applied to exploiting our native talent to the best advantage, in the national interest. This is a matter of direct concern to readers of this journal, because many model engineers are inventors of no mean ability, as proved by the numerous enquiries received by us for advice in the matter of marketing inventions. We are sorry to say, however, that owing to the attitude referred to, we hear all too many stories of



by 2 $\frac{1}{2}$ in. stroke, and the coupled wheels are 6 in. in diameter. The boiler barrel contains twenty 1-in. fire-tubes and four 1-in. superheater flues and is fitted with the correct G.W. type of safety-valves. It is fed by an injector, though an emergency hand-pump is provided in the tender. The working pressure is 85 lb. per sq. in.

The valves are operated by proper Churchward-Stephenson link-motion, and the engine is very powerful; when at work, it gives the exact G.W. "bark."

The photograph was taken by Mr. R. G. Bruten, of Gloucester.

Why Import Brains?

● THIS COUNTRY is notoriously blind to its own native talents and virtues, and when seeking the best either in art or culture, science or engineering, we generally look anywhere but on our own doorstep. One often reads in the Press that rights have been acquired in this country for the manufacture of some foreign design or invention, while equally meritorious and progressive British inventions are left lying on the shelf. It has been proved on innumerable occasions that the products of this country, both concrete and abstract, can compete on equal terms, at least, with those of any country in the world. A great deal has been said about intensifying the drive for exporting manufactured products, in the form of goods shipments, but it does not seem to be realised that abstract products—brains, skill and craftsmanship—are an equally important "invisible export," and just as much effort should be

disappointment and frustration in these matters, and sometimes the best advice we have been able to give inventors is to cultivate a foreign accent and adopt an unpronounceable name, before approaching industrialists or government officials with an invention.

The Tale of a Stolen Model

● ON SEVERAL occasions, reports of models which have been lost or stolen have appeared in these columns, and it is worthy of comment that in many such cases, the publicity given in this way has led directly or indirectly to the model being restored to the owner. Some weeks ago, we published photographs of a four-cylinder model petrol engine built by Mr. H. R. Puntis, of Southampton. Not long after this, we received a telephone call from a friend in the model trade, who stated that he had been offered an engine which seemed to correspond with the published description. We expressed the opinion that it was hardly likely that there could be more than one such engine in existence, and that the model offered for sale was probably the actual one described. The sequel to all this was that the would-be vendor was eventually fined £20 and costs for receiving stolen property, and Mr. Puntis got his engine back. The moral of this story is that those who hold the code of ethics that "anything is right if you can get away with it" should be deterred by the thought that good models are as distinctive and identifiable as high-class jewellery, and therefore, in the language of the fraternity, "too hot to handle."

CONCERNING MODELS

Describing half a century of model making and the building of "Amalgamation"—1946 "M.E." Championship Cup winner

by S. T. Harris

THE record of my workshop and model making experience goes back 50 years or thereabouts, to a horizontal steam engine, 1 in. bore \times 2 in. stroke, made by my father. He told me that the engine was completely fabricated, the cylinder being built up from tube and plate and sweated together. I only saw a photograph of this, as he had sold it before I was born; but my first incentive was this photograph and a table engine, $1\frac{1}{2}$ in. bore \times 3 in. stroke, which he had in his possession at the time, but eventually sold (Photo 1). He had also a lathe which he had made with a bed of 2-in. \times 2-in. hardwood, head and tail-stocks cast in type-metal and fitted with a T-rest. Accessories, apart from a pair of centres, included an eccentric chuck, normally used for ornamental turning, but he had converted this to a compound slide-rest.

A sewing-machine stand and treadle completed the lathe, and on this I used to practise turning with T-rest and hand turning-tools, which I made from old files, for father would not allow me to use his slide-rest. It had a small faceplate, but not a chuck, so I had to fix everything to the faceplate if any piece wanted chucking.

After a bit, I became quite proficient with my turning, my father, of course, instructing me when he was there; and in due course, when I was about 13 years of age, I had saved up 3s. 6d., and bought a set of launch engine castings, with

necessary screws, $\frac{1}{2}$ in. bore \times 1 in. stroke, from a firm at Leek, in Staffordshire. My father bored the cylinder for me, bolting it on his slide-rest and using a boring-bar; but the rest I did myself, and eventually it was finished.

I then wanted a boiler for it, so I had a syrup tin, soldered the lid on and fitted three legs so that I could put a spirit lamp underneath. This worked quite well, but my father insisted on putting a safety-valve in. By the time I had made and tired of this engine, I was out at work.

My first job was at a large printing works, in St. Albans, Hertfordshire, as I loved machinery. They had three gas engines, and whilst I was there a 250-h.p. Marshall compound Corliss-valve engine and Lancashire boiler was installed. Oh, how I lived round this engine; unfortunately, the powers - that - be would insist on kicking me out,

but it was not long before I was back again. I decided that the compound Corliss was beyond me to model; but the firm at Leek advertised a set of gas engine castings, 1 in. bore with cylinder bored and flywheels turned. These I bought and eventually finished, and I managed to get the engine to run; but, as older readers will remember, this type of engine was not a success.

About this time, I purchased my first copy of *THE MODEL ENGINEER AND ELECTRICIAN*, as it was then called. The first one I had contained a drawing of a single-driver locomotive

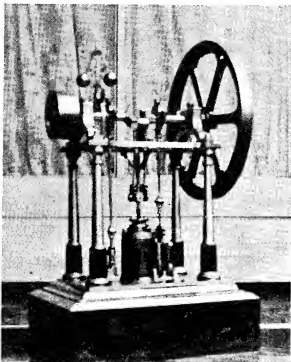
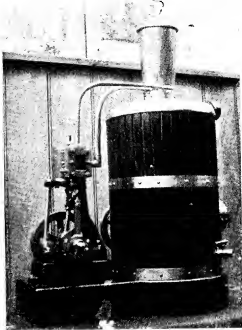
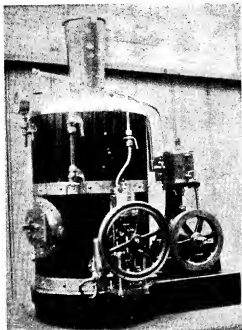


Photo No. 1. My first incentive

by a Mr. Pearce, and what impressed me was that the pressure-gauge was not in the cab, but outside, mounted on the plating by the firebox. How I longed for the material to make this; but the desire soon wore off, as there were many other things which took my eye when THE MODEL ENGINEER came out each month, I think it was, which I always looked forward to

purposes. My father built a workshop in the garden, and I purchased a Drummond round-bed lathe complete with stand and treadle costing £8 os. od., truly wonderful value, even all those years ago.

I now had a boiler doing nothing, and as the No. 9 had turned out such a success, I bought a set of castings for a Stuart 1½-in. × 1½-in. vertical



Photos Nos. 2 and 3. Two views of a Stuart Turner vertical engine mounted on base, with boiler and donkey pump

eagerly, and have done so to this day. However, after three years at the printing works, I got a job in the engineering industry, and I was now in my element.

When I was 18 years old, I purchased a set of castings for a Stuart Turner No. 9 horizontal engine, 1½ in. bore × 1½ in. stroke, and was able to bore out the cylinder and turn the flywheel on a 3½-in. Drummond lathe belonging to a friend, but all the rest of the turning I did on my father's home-made lathe.

I then purchased a steel vertical centre-flue boiler, 7 in. × 14 in., second-hand, for 12s. od., and after making a hand-pump for testing it, hydraulically, I connected it to the Stuart engine and got up steam; I was gratified to see the engine run beautifully, driving a small dynamo which I had borrowed. After giving it a few good long runs I took it to pieces, cleaned it up, and painted it; a glass case was made for it, and eventually it was exhibited at the 1923 "M.E." Exhibition, gaining a silver medal and diploma.

I now wanted a better lathe of my own, and, up to now, had had a spare bedroom for the workshop; but this was now wanted for other

I could now get over my turning much better and quicker on my new lathe, and eventually I finished it, made a pattern and got a casting to mount the engine and boiler on one base, and a donkey pump at the side, lagging the boiler with strips of oak with copper bands, copper top and chimney. (Photos Nos. 2 and 3.) This engine worked very well but, of course, the boiler was too small for serious work really, so I sold it.

I was now in my 20's, and working away from home for three years stopped my model making activities. After this, when I did return, I had my own home, commandeered a spare bedroom, set my lathe up, made myself a bench (I had previously used my father's), and started again. I now had a small daughter, and naturally she wanted a model perambulator, so I made her a model one-third the size of her own.

I then purchased a set of castings of the small "M.E." undertype engine from Messrs. Bassett-Lowke. This I built up, but fitted steel connecting-rods with gibbed and cotttered small and big-ends fitted with screwed wedges, as in the large undertype, balanced crankshaft and eccentric-driven feed-pump fitted with by-pass.

When building this model, I wanted an overhead gear to the lathe, so rigged one up with $\frac{1}{4}$ -in. gas-pipe and $\frac{3}{4}$ -in. shaft fitted into ball-bearings which were housed in blocks of teak and rested on $1\frac{1}{2}$ -in. angle at either end of the lathe.

My father had presented me with his compound slide-rest previously mentioned, and I altered it back to its original form, i.e. eccentric and

castings of chimney, dome and safety-valve casing, so I had to get some sheet copper, as none was supplied, though the war made things difficult to obtain. At last, I managed to find what I wanted, also some $\frac{1}{4}$ -in. copper rivets, so started on the boiler. This I riveted and sweated and eventually finished, mounted it on the chassis and connected it up. I hadn't a

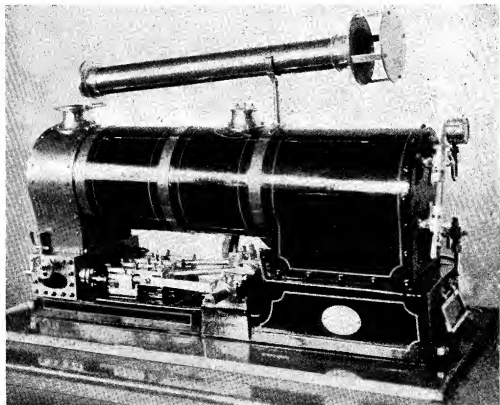


Photo No. 4. An "M.E." undertype engine

elliptical chuck; and fitted it to my lathe. This was excellent for turning oval glands, and also, with the aid of my drilling-spindle and the dividing-wheel on the chuck, I could set cylinder covers or the like over, after turning, and drill the bolt holes. I still have the chuck in my possession. This model was well tested and hung about for a year or two in an unclean state.

Then came the 1914-1918 war, and again stopped my model making for a bit. In the meantime I purchased a second-hand partly-machined set of castings of a 1-in. scale Stirling single locomotive by Martin of East Ham. The work done on it was shocking, so I started on reboring the cylinders, as they were badly scored, and fitted liners; the wheels were machined when I bought the set and were not too bad; the frames were cast and usable, also bogie casting and connecting-rods which had not been touched.

Then came the boiler; there were only the

track to run the engine on and was anxious to see the wheels go round, and also how my boiler performed. I decided to block it up and get up steam. I did this one Saturday afternoon; but my greatest mistake was taking some of the wife's house-coal which badly sooted up the tubes.

Fortunately, there were only seven of them, $\frac{3}{8}$ in. diameter, from the cleaning point of view, but I had made a great mistake in not putting more in for efficiency. A nice tarry treacle smothered them and the firebox, and I shall never forget the awful job I had to get the things clean again. In the meantime, I had realised that steam coal was what was wanted, so purchased $\frac{1}{2}$ cwt. from a coal merchant friend of mine and had another try. This went better (or so I thought) this time, and I managed to raise 60 lb. of steam, but I could not retain it with the engine running about 60 revs. per min.; otherwise, things seemed to be satisfactory.

After this run, I was cleaning out the firebox, and to my surprise I saw that the firebox roof had collapsed and was trying to shake hands with the firebars! My roof stays had given way. This made me feel rather sick of boiler making, and I put the whole lot on one side in disgust. We hadn't "L.B.S.C." to guide us then.

The boiler I scrapped, except for the barrel which I used again for the new boiler. I fitted it with a Belpaire firebox and seven $\frac{3}{8}$ -in. tubes and one 1 in. for superheater, though undoubtedly it would have been better with more. I riveted and sweated it and finally tested it hydraulically to 200 lb. I did not have much spare time for a year or two after this, but eventually this engine

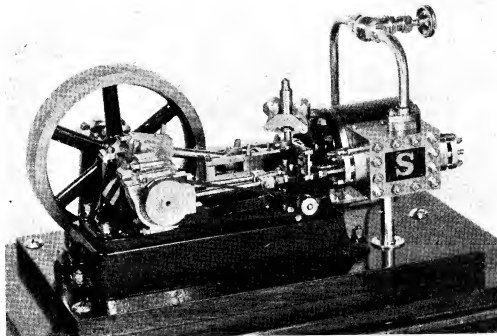


Photo No. 5. Stuart Turner engine No. 9, fitted with Hartnall governor and variable expansion gear

After I recovered from my shock, which, believe me, it was, and a terrible one too, I started on a $\frac{3}{8}$ -in. \times $\frac{1}{4}$ -in. vertical engine; but as the war was still going on, I could not get castings, so I fabricated the cylinder and support with guide-bars, bed and base. The bearings and big-end I lined with white-metal, and fitted a shaft governor. This I ran from the undertype boiler, gaining first prize in the "M.E." "built-up" competition, in 1920, also a bronze medal at the exhibition in 1922. I then took the undertype to pieces, cleaned, painted and lined it, finally finishing it and eventually exhibiting it at the 1924 "M.E." Exhibition, when it gained a silver medal and diploma. (Photo No. 4.)

The first world war was now over, and "L.B.S.C." had started his articles. These I well and truly digested. I dismantled the Stirling and, using the bits and pieces, such as cylinders, eccentric, connecting-rods, etc., turned it into a 2-6-4 tank engine. The tender castings had not been touched so I used the wheels for the drivers, turning a recess round the bosses, $\frac{3}{8}$ in. deep, and milled spokes away where necessary and fitted cranks, finally brazing them

was finished and fitted with a mechanical lubricator and donkey pump.

After this, I moved to Cricklewood, and with moving, had been deprived of my bedroom workshop, as it was wanted for my son, who was now seven years old; so the locomotive was put out of the way for a year or so. Eventually, I was able to carry on at the place of my employment, which was better than not continuing my hobby at all.

The first job I did was to alter the Stuart No. 9. I fitted new bearings, lined with white-metal and fitted steel caps with oil wells and wick oilers, also an outer bearing, after extending the crankshaft, and fitted balance-weights and banjo for oiling big-end fed from the oil well of one of the main bearings, parallel slide bars, new connecting-rod, fitted with gibbed and cottered small- and big ends and the brasses run in with white-metal, Hartnall governor and variable expansion-gear. I had to make a new steamchest to house both valves, and this was made out of a block of steel. This engine was running on the S.M.E.E. stand during the 1947 exhibition. (Photo No. 5.)

(To be continued)

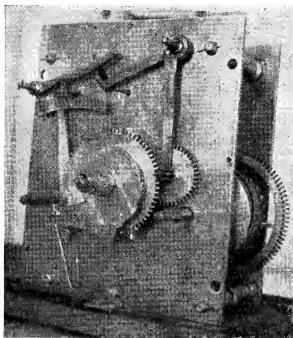
★ "Rejuvenating Grandpa"

by "Artificer"

Some Practical Notes on the Repair and Restoration of Old Clocks

SO far, we have dealt only with the time-keeping part of the clock, or as it is usually termed, the "going" train. Most of the clocks of the type under consideration, however, are equipped with striking mechanism, and in some cases are further elaborated with chiming or calendar work. From the purely mechanical point of view, this gear is fairly straightforward, and is less susceptible to derangement by minor errors in adjustment than the going train, but nevertheless; it is very frequently found to be out of working order, or working erratically. Many repairers concentrate on getting the clock to work as a timepiece, and give scant attention to the striking train; while others, particularly amateurs, seem to regard the striking gear as a mystery, and avoid touching it whenever possible.

There is, however, no excuse whatever for being either overcautious or lazy about dealing with this part of the clock; if a clock has been designed to strike the hours, it cannot be regarded as completely in working order unless it does so quite as regularly and infallibly as its hands mark the time. It may, however, be observed that in the original regulator clocks, the fitting of striking gear was avoided, because it was considered that there was a risk of it affecting their timekeeping qualities. (Incidentally, the regulator type of clock was produced to fill the need for a very accurate timekeeper, to serve as a "control" by the clockmaker or repairer when adjusting and rating other clocks, long before



Front of English long-case clock movement, showing rack striking work

the days of radio time signals.) Some of the later regulators were fitted with striking gear, but were often regarded with suspicion by meticulous horologists. However, the almost universal fitting of striking gear to English long-case clocks does not seem to have impaired their time-keeping accuracy to any great extent.

Striking Gear Systems

There are, generally speaking, two types of strike control mechanism employed in ordinary clocks, namely, the "rack" and "locking-plate" striking gear respectively. The essential difference

between the two systems is that in the former, the going train not only controls the release of the striking gear, but also the counting of the strokes; whereas in the latter, it only releases the striking train, the count being controlled by means within the striking train itself. Both systems work quite reliably, and have stood the test of time, but it will probably be agreed that the rack striking gear, which is fitted to most English clocks, except some of the earlier types, is mechanically the sounder of the two, and the more readily accessible for examination or servicing. An outstanding advantage of this gear is that, having the counting controlled by the time train, it cannot get out of step with the latter and strike the wrong hour at the right time.

Readers may have heard the parody on the classic song of the grandfather clock, in which it is stated that "when the hands point to four and the clock strikes eleven, we know it's a quarter to three!" This particular specimen, it seems, cannot have been fitted with rack striking gear, in which such irregular conduct

*Continued from page 677, Vol. 99, "M.E.," December 23, 1948.

would have been impossible! The rack which constitutes the salient component in this form of strike control consists of a toothed segment, usually fitted to a stationary pivot on the front frame-plate of the clock, to one side of the motion work. For most of the time, the rack is locked in the position shown in Fig. 7, by the rack hook, which engages in one of the teeth of the rack. Mounted on the hour cannon of the motion work is a spiral cam or "snail," which serves as a limit stop for the tail of the rack when it is released and allowed to move to the outward position, assisted by gravity or a small torsion spring. Thus the position of the snail determines the number of teeth in the rack which are released, and the number of blows subsequently struck by the hammer (not shown in diagram). Release of the rack is effected at the appropriate time by the lifting lever, which is actuated by a pin either on the minute arbor, or the intermediate motion wheel, as shown (the latter position is the more common in English long-case clocks). When the rack is released, the pin at its outer end moves away from the tail of the gathering pallet, which normally locks the train; but the end of the lifting lever simultaneously engages a projecting pin on the fly arbor (not shown) preventing the train from running more than about half a turn at this point. This is known as the "warning" and is denoted by a whirr and a click, usually at about ten minutes to the hour. Complete release of the train occurs when the pin in the motion wheel moves past the end of the lifting lever, allowing it to drop and thus free the fly arbor. The train then starts to run, actuating the bell hammer, and for each stroke, the gathering pallet makes a complete revolution, picking up one tooth of the rack each time and propelling it towards the right, until the tail of the gathering pallet comes in contact with the rack pin and re-locks the train. Backward motion of the rack is prevented by the rack hook, which finally holds it in the locked position until it is again lifted to free the rack in preparation for the next hour strike, when the rack tail comes in contact with the next step of the snail.

In clocks designed to strike a single blow on the hour gong at the half hour, a second pin is fitted in the motion wheel at 180 deg. to the first, and at a smaller radius, so that the rack is not completely unlocked, but allowed to fall back only a single tooth.

The locking-plate system of striking, shown in Fig. 8, has somewhat similar devices for releasing the striking train, including the preliminary "warning," but instead of the rack and snail count mechanism, the number of hammer blows is determined by a "locking plate" or wheel, on the striking train itself. This has a number of slots or gaps cut in its edge, for the reception of the tip of the locking lever, but when the latter is lifted by the lever actuated by the motion wheel, and the train starts to run, the locking lever is held out of action until the next slot comes into position, so as to allow it to drop and re-lock the train.

In both systems of striking, the rate at which the blows are struck is controlled by a fan brake, or "fly" on the last wheel of the train, and if it

should be desired to alter this rate, which is rather unlikely, the area of the blades may be varied. The fly is generally held on the shaft by a spring which acts as a friction damper or shock absorber to reduce inertia loads, and if this is weakened, slipping may take place, resulting in "racing" of the striking gear. Sluggish striking, on the other hand, is caused by stickiness or mechanical inefficiency in the train; if it cannot be remedied by judicious lubrication of the pivots, look out for worn or damaged wheels and pinions, or bent pivots.

The "timing" of the various wheels in the striking train, relative to each other, is highly important, but one cannot lay down fixed rules for this, and one must be guided by common sense. When the train is locked, the hammer lifting-pins should be out of contact with the hammer tail, as shown in Fig. 8, so that a free run of the train can take place before lifting starts. Otherwise, the friction load may prevent the train starting up. When the "warning" takes place, a sufficient length of run should take place before the fly-shaft is intercepted, to make sure that the train is not re-locked when the warning lever falls back. Should the strike take place either before or after the hour, this may mean that the tail of the warning lever is worn or damaged, or that the timing of the motion gear is deranged. All these faults are easier to detect and deal with in the case of rack striking gear, where the control mechanism is outside the frame-plates, than in locking-plate gear, where it is between the plates and often very cramped and inaccessible.

Chiming gear may be regarded as a secondary and independent striking train. The individual gongs or bells are usually operated by a pin barrel like the old-fashioned musical box, and sometimes a choice of "tunes" is provided by arranging the barrel to shift endwise. Control is nearly always on the locking-plate principle, as rack gear can only be used where a single tone chime or a definite repeated sequence is employed—as in repeater clocks. Variations in striking or chiming gear are sometimes encountered, as in clocks which strike in the manner of ship's bells, also cuckoo and trumpet clocks, but these need not be described in detail here.

Calendar work may be simple or elaborate; in its simplest form, it consists of a 62-toothed ratchet disc, set behind the main dial, and operated by a single tooth on the hour cannon, a back-stop spring or detent being fitted to prevent accidental movement, but generally capable of being overpowered or released for hand setting. Dials for showing the phases of the moon and other astronomical events call for further gearing, and have obviously been a labour of love on the part of many early clock-makers. It is a pity that essential parts of such mechanism are often found to be missing, and one is inclined to wonder who has been responsible for the removal of these parts—was it some professional repairer who didn't want to be bothered, or an inexperienced amateur who couldn't assemble them properly?

Readers' Queries

A number of letters have been received from

readers, commenting on these articles, and in some cases discussing individual problems in clock repairing. One reader has asked how to convert a 24-hour clock to run for eight days, and as this question often arises, it may be briefly dealt with here. It is often possible to effect this alteration without touching the clock movement itself, simply by altering the weights

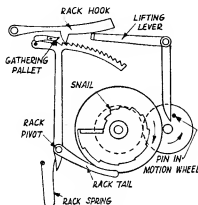


Fig. 7. Release mechanism of rack striking work, mounted on front frame-plate of clock movement

and their method of suspension; but much depends on the details of the clock and the accommodation space in the case. The essential thing is to increase the effective length of run of the weight line, and as it is not practicable to increase the vertical travel of the weights to the required extent, the alternative is to use a system of pulleys to give the required multiplication of movement—"purchase" in reverse!—in conjunction with an increase of the weight in the same proportion, which in this case would be eight to one, requiring an eight-purchase system of pulleys.

The other method would be to add another wheel to the clock train, giving a further multiplication of eight to one from the main barrel to the escape wheel—or the fly, in the case of the striking train; the weight would have to be similarly multiplied in this case also. But this would be more difficult to carry out, and it may also be hardly practicable to accommodate the extra wheels in the existing frames; the former method is generally much easier and equally effective, though some difficulty may arise in accommodating the much greater length of line on the barrels.

Other readers have propounded the old problem of the clock which goes for a certain length of time and then invariably stops for no apparent reason. If the length of run is indeterminate, the cause is usually incorrect adjustment of the beat or pallet engagement, or "general debility"—in other words, mechanical inefficiency due to wear or lack of lubrication. But, if the clock works quite healthily for a definite period of time before stopping, it is clear that the cause must be connected with

something which operates periodically, and a clue can usually be found in the length of time which elapses between symptoms of faulty working. It may be that the juxtaposition of worn wheel teeth, or bent pivots, on two or more arbors, is the cause of the trouble. In spring-driven clocks, friction between the coils of the spring will sometimes cause stoppage and the obvious remedy is to lubricate the spring.

A more obscure fault which is more or less—and sometimes very definitely—periodic in character may sometimes be traced to the "sympathetic" swaying of the weights when the length of line brings them more or less into "tune" with the period of the pendulum. The shifting of the centre of gravity of these fairly considerable masses will impose heavy stresses on the seating board of the movement, and sometimes on the entire clock case, which if not quite rigid, will sway hardly perceptibly, but no less sufficient to upset the pendulum adjustment. Lack of even support of the case will accentuate this, or it may be due to the case resting on resilient material, such as a carpet; as already mentioned, fixing the clock firmly to the wall is a very sound policy, ensuring the utmost rigidity of support. But a complete cure for swaying of the weights can only be effected by fitting them in guides or tunnels, in certain cases where this trouble is unusually persistent.

Other queries deal with the conversion or

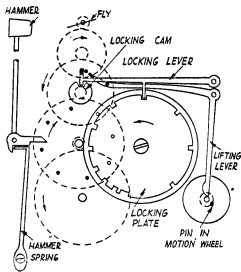


Fig. 8. Complete locking-plate striking train

drastic alteration to clock movements, or to unusual types of clocks which are hardly within the scope of these articles, but will be dealt with later if they are considered to be of general interest. It may be mentioned that the general tone of readers' letters is very encouraging, and denotes a much wider interest in clocks than is commonly believed.

(Continued on page 22)

"Maid of Kent"

by "L.B.S.C."

Pipe Connections for Outside Cylinders

SEVERAL readers who are building the "Maid" to represent one of the old Midland compounds with outside cylinders, want to know why I didn't specify two cylinders attached to a common steam-chest, similar to the arrangement adopted by the late Mr. T. W. Averill for his North Eastern "Atlantic," and other engines. They reckon it would have been easier to machine and fit, and would have simplified the pipe work, as the exhaust ways could have been drilled or cored in the casting. Probably the single steam-chest might have been an advantage in some respects, but it has its disadvantages also. First, the two smaller steam-chests are easier to machine on the average small lathe usually found in home workshops; I have heard plenty of tales of woe from builders who have found the inside-cylinder casting as big a handful as they ever wanted to tackle! Secondly, special patterns would have been needed, with ports, etc., differing from those specified for the inside cylinders, necessitating changes in the valve-gear, and other little discrepancies; and don't forget that anything special, immediately puts the price up—which is a big consideration to those of our fraternity who cannot do without a "rag" or a pipe. Thirdly, I don't fancy installing such a huge box as the common steam-chest would be; you have to fill it with steam at boiler pressure before the engine will start, and the outside of it would form a jolly fine radiator all the time the engine was running, dissipating valuable heat that the boiler has to make good. Taking all into account, I think the arrangement given, has more advantages than that suggested, and that is why I specified it. Well, let's do business.

Steam-pipes

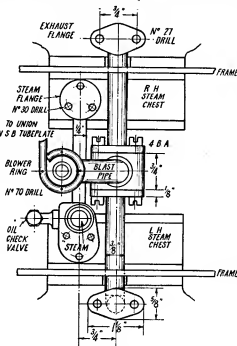
No alteration will be needed to the superheater, as the union on the vertical steam-pipe is screwed

same size and pitch, and comes in the same place as its fellow-conspirator on the inside-cylinder engine. The whole bag of tricks is used up as a single unit, and is attached by flanges to the tops of the steam-chests which are inside the frame. The right-hand flange may be either a

casting, or a $\frac{1}{2}$ -in. length of $\frac{1}{2}$ -in. brass rod. Chuck in three-jaw, face, centre, and drill $\frac{1}{8}$ in. diameter for $\frac{1}{8}$ in. depth. Drill a $\frac{1}{4}$ -in. hole through the thickness of the flange, to meet the centre hole; then drill three No. 30 holes for fixing screws, and take a skim off the contact-face of the flange, to remove all burr.

Either a casting, or a small block of brass machined up to the same shape will be required for the left-hand flange; you'll see the shape of it in both the plan and elevation drawings, and the latter shows the "innards" as well. Incidentally, at least three of the good folk who are supplying "approved" castings for these engines, have informed me that they faithfully follow out all suggestions that appear, regarding small

special time- and labour-saving castings, so that all unnecessary work is easily avoided; good luck to their enterprise! The casting, or block, should first be chucked in the four-jaw with the underside outwards, and the circular flange running truly; same is then faced off, centred, and drilled $\frac{1}{8}$ in. to a depth of $\frac{1}{8}$ in. as mentioned above. Now reverse in chuck, and set the steam-pipe boss to run truly; face this, centre, and drill $\frac{1}{4}$ in. to a depth of $\frac{1}{4}$ in. Next, in the thickness of the casting, drill a $\frac{1}{4}$ -in. hole cutting across the bottom of the larger hole, into the $\frac{1}{8}$ -in. ditto; see section. At right-angles to the latter hole and level with the upper hole, drill a $7/32$ -in. hole and tap it $\frac{1}{4}$ in. by 40, for the stem of the oil check-valve. The position of this is clearly shown in the plan view. Note, you will need to make the stem of the oil-check a little longer than that shown for the inside-cylinder job; $\frac{1}{4}$ in.

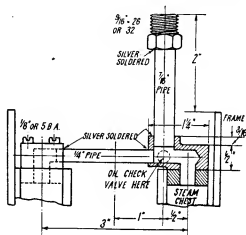


Plan of steam and exhaust pipes erected

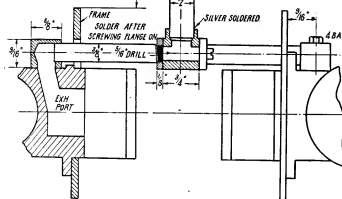
from centre of clack body to shoulder on stem, would be a suitable size. Beginners should be very careful to have this hole exactly in the right place, or the two cylinders won't get equal shares of the oil supply. On a 2½-in. gauge commercially-made locomotive costing nearly £60, which I repaired for a friend, the oil-feed was introduced into the middle of a cross-pipe between the cylinders. As the steam connection was made about ¾ in. to the side of this, and the oil naturally would not flow against the rush of steam, the cylinder nearest the steam-pipe emulated Old Mother Hubbard's dog, and you should have seen the state of the cylinder bore, piston, port-face and valve, when I dismantled the engine!

Drill three No. 30 holes for fixing-screws as shown in the plan view. Next, chuck a bit of ⅝-in. hexagon brass rod, in three-jaw. Face, centre deeply with a big centre-drill, and drill down about ¾ in. depth with ⅛-in. drill. Turn down ⅛ in. of the outside to ⅝ in. diameter, screw ⅝ in. by 26 or 32, and part off at ¾ in. from the end. Reverse in chuck, and open out the other

view; the two flanges should bed down nicely over the ⅛ in. holes in the steam-chests. If they don't, it is easy enough to teach them good manners, as they are not fixed to the cross-pipe. When they behave themselves, remove the whole issue, being mighty careful not to shift the flanges or the vertical pipe. Then, at one heating, silver-solder both flanges to the cross-pipe, the vertical pipe to the flange, and the union at the top, to the vertical pipe. Pickle, wash, and clean up; then attach the flanges to the steam-chests by three ⅛-in. or 5-B.A. brass screws, over the



Part section of steam pipe assembly



Part section of exhaust pipe assembly

end to a depth of ¼ in., with ⅞-in. drill. Cut a piece of ⅞-in. copper tube to a length of 2½ in. and clean the ends. Poke the end of a ⅞-in. parallel reamer into the 27/64-in. hole in the left-hand flange fitting, until the end of the bit of pipe will drive in tightly; then mount the union-screw on the other end. Connect up this fitting with the circular flange, by a 2-in. length of ½-in. copper tube, so that the centres of the holes in the undersides of the flanges are 3 in. apart, centre to centre. Now try the whole issue in place on the two steam-chests, as shown in the elevation

view. ⅞-in. holes. Cheese-head screws will do all right for this job; if a full-size locomotive designer thought that slotted screws would be the most convenient for use in any special location, he would use them without hesitation, and they are certainly most suitable in the present instance! Put a 1/64-in. "Hallite" or similar gasket between each flange and steam chest, and screw in the oil-clack with a smear of plumber's jointing on the threads. The union under same can then be connected to the union under the mechanical lubricator, as described

some time ago when dealing with that component.

Exhaust-pipes

The exhaust-pipe assembly cannot be made and fitted as a single unit, as the oval flanges won't go through the holes in the frame; so it must be erected in sections. Otherwise, the cylinders would have to be temporarily removed to get it into position. Each section of the cross-pipe has a block flange with a right-angled hole in it at the cylinder end, and a plain oval flange, made from ½-in. brass plate, at the inner end.

The latter are screwed to a central casting which carries the blast-pipe.

Each of the end flange fittings is made from a casting, or a block of brass $\frac{3}{8}$ in. wide, $1\frac{1}{2}$ in. long, and $\frac{1}{8}$ in. deep. Make a centre-pop in the middle of one of the flat faces; chuck in four-jaw with this mark running truly, then drill it first with a centre-drill, then for a depth of $\frac{1}{2}$ in. with a $\frac{3}{8}$ -in. drill. Face off truly; then in one of the long sides, $\frac{1}{2}$ in. from top, drill another hole for the end of the cross-pipe. Use letter U or $9\frac{1}{2}$ -mm. drill if you have it; if not, $\frac{3}{8}$ -in. will have to do. The screwholes are drilled No. 27 at $\frac{1}{2}$ in. centres. Smooth off any burring on the contact face.

An end view of the central block carrying the blast-pipe, is shown in the separate illustration of that component; the plan view of it is shown in the plan of the whole doings. If a casting is available, it will be the same shape as the end flange, with a boss in the middle, $\frac{1}{2}$ in. diameter, for the blast-pipe. If you make it from a brass block, the shape doesn't matter a bean as long as you can put the blast-pipe in the top, and bolt the flanges to the sides. Make a centre-pop in one of the sides, chuck in four-jaw with this running truly, then drill right through with a $\frac{1}{8}$ -in. drill. Face off any burr, reverse in chuck, and face the other side, to a total width of $\frac{1}{2}$ in. Re-chuck with the blast-pipe boss running truly; face off, centre, drill into the cross-passage with $\frac{1}{8}$ -in. drill, then open out to about $\frac{1}{2}$ in. depth with $\frac{1}{2}$ -in. drill.

The two flanges which attach the pipes to the block, are filed up from $\frac{1}{2}$ -in. brass plate, drilled in the centre with $11/32$ -in. drill, and tapped $\frac{1}{2}$ in. by 40. The screwholes are drilled No. 27 at $\frac{1}{2}$ in. centres. The cross-pipes are two $2\frac{1}{2}$ -in. lengths of $\frac{3}{8}$ -in. by about 20-gauge copper tube, with $\frac{1}{2}$ in. of $\frac{3}{8}$ -in. by 40 thread on one end of each. The blast nozzle is made either from a casting, or a $\frac{1}{2}$ -in. length of $\frac{1}{2}$ -in. hexagon brass rod. Chuck in three-jaw, centre, and drill right through with $\frac{1}{2}$ -in. drill. Open out for $\frac{1}{2}$ in. depth with $15/32$ -in. drill, and tap with the finest $\frac{1}{2}$ -in. thread tap you have available. Chamfer the corners of the tapped end, and bevel off the "Mount Vesuvius" end as shown in the illustrations. The blast-pipe itself is made from a piece of $\frac{1}{2}$ -in. copper tube, about 20-gauge, bent to the shape shown in the elevation view. If you kick off with a piece of tube a bit longer than needed, well anneal it, and fill it with melted lead, you will find it quite amenable to bending. How I bend fairly large tubes, is to put a piece of round steel vertically in the bench vice, slip an extension over each end of the tube to be bent (bit of iron gas barrel, or something similar), set the location of the bend against the steel "bending post," and pull the ends. Although not so strong as I used to be, I can still teach a bit of lead-filled copper pipe how to go around a corner! In passing, there are two or three useful machines on the market, which will bend pipes and rods to any required radius without kinking; but the price is far too high to warrant the purchase of one, for the small amount of bending needed in the average home workshop. Anyway, don't lose any sleep, or start to fret, if you get two or three marks or dents on the blast-pipe; Inspector

Meticulous can't see through the smokebox shell! Cut the bend to length, melt out the filling, screw the upper end to suit the nozzle, then silver-solder the blast-pipe into the boss in the centre-piece.

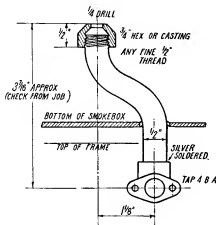
Before final assembly, try the whole lot in position. Screw the plate flanges on to the ends of the cross-pipes; put these through the holes in the frame, from the inside, and put the block flanges on the other ends, same resting on the cylinders over the exhaust-holes. Temporarily place the centre-piece in position, and clamp the two plate flanges to it by aid of a toolmaker's cramp. Then adjust the block flanges so that they are exactly over the exhaust-holes in the cylinders. Release the cramp, and without shifting the pipes in the block flanges, unscrew the plate flanges, and remove the pipes and block flanges, pulling them through from the outside. Remember which is which, and silver-solder the joints. Poke them back through the holes again; replace the plate flanges, see that both are horizontal, and then give them a spot of soft solder, to prevent them shifting and allowing the blast-pipe to get out of line with the chimney liner. Just apply a little Baker's fluid or other liquid flux to the pipe where it enters the flange, play the flame of a small blowpipe or lamp on it, and touch it with a bit of tin solder. If preferred, do the job with a big copper bit. Wipe off any residuum with a wet rag or bit of wet waste. If the pipe projects through the flange, smooth it off with a file. Replace the centre-piece, temporarily secure with the cramp, mark off the position of the screwholes in centre-piece with a bent scriber put through the screwholes in flanges, remove, drill No. 34, and tap 4-B.A. Replace, and secure with four 4-B.A. screws; cheese-heads will do. No gaskets are needed, but you can smear the contact faces with plumber's jointing if you so desire, before attaching "for keeps."

I know jolly well that somebody is going to write in and tell me that you can't get at the screw adjacent to the left-hand steam flange, to tighten it up with a screw-driver. Well, they can just save paper, ink, postage, their time, and mine; because we have not yet fixed the block flanges, and you can slew the pipe around clear of the steam flange whilst you put both screws in on that side! The two on the other side are unobstructed. Finally, attach the block flanges to the cylinders with two 4-B.A. screws in each; you can use $1/64$ -in. "Hallite" or similar gaskets here, if you so desire, which will save the trouble of scraping a true face on the cylinder casting. That concludes the "plumbing job" for the outside-cylinder engine.

Blast-pipes for Inside-cylinder Engines

The blast-pipe and nozzle for the inside-cylinder "Maid of Kent" are made in the same way as the one described above; but the pipe itself is shorter, as shown in the separate illustration. Instead of being silver-soldered into a boss, it has a circular flange $1\frac{1}{2}$ in. diameter, silver-soldered to the lower end. This is either made from $\frac{1}{2}$ -in. or $5/32$ -in. brass plate, or can be a slice of that thickness parted off, or a $1\frac{1}{2}$ -in. brass rod. If the latter, chuck the bit of

rod, face, centre, and drill it $31/64$ in.; use a pilot drill about $1/8$ in. first. Part off the slice, then put the lead end of a $1/2$ -in. parallel reamer in just far enough to open the hole to a tight fit for the blast-pipe end. Drill the four screwholes No. 30, then do the silver-soldering job, finally attaching the complete outfit to the circular flange on top of the inside steam-chest, by four



Blast pipe for outside cylinders

brass $1/2$ -in. or 5-B.A. screws, round-head or cheese-head will do. If the faces are true, no gasket will be required; but if there is any roughness, use a $1/64$ -in. "Hallite" or similar bit of jointing between the faces.

The blast-pipe for the "Minx" is made the same way, but is easier, as there isn't so much bending to do, the offset only amounting to $1/4$ in. However, the flange at the bottom has to be put on as shown, to suit the inclination of the cylinders; so before silver-soldering the flange to the blast-pipe, put it on temporarily, and try it in position, to ascertain if the top part stands vertically. When O.K. go ahead, finish off and erect as above.

Blower-ring

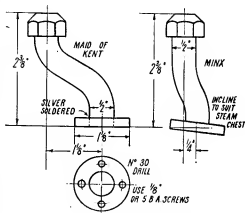
It was my original intention to specify a combined blast and blower nozzle, but several builders say they would rather have separate blower-rings. The reason is, that the engine will only have a soft blast when notched up (they say my engines nearly run on no steam at all!) and if any excess of oil comes up with the exhaust steam, it isn't thrown out of the chimney, but just trickles over the nozzle on to the section which contains the blower holes. Then fine ash and bits of cinder start accumulating on it, like flies on a sticky paper, and finally the holes become choked. All serene—anything to oblige; if you are afraid of that happening, just get a length of $1/4$ -in. copper tube, soften it and bend one end into a ring approximately $1/8$ in. internal diameter. Butt the open end against the pipe, at the end of the ring, and silver-solder the joint. In the ring itself, drill four No. 70 holes, shown by the black dots in the plan view of the pipe

work for the outside-cylinder engine. Put the boiler temporarily on the chassis in the position it will eventually occupy, just blocking it up with a bit of rod across the frames; put the ring over the blast nozzle, then bend the pipe around to the union on the smokebox tubeplate. Cut the tube short at that point, and fit a union nut and cone to it, making the nut from $3/8$ -in. hexagon brass rod, and tapping it to suit the nipple on the end of the hollow stay. The blower-pipe and ring are not fitted permanently until the boiler is erected.

Nature won't have it!

A follower of these notes whose interest lies in "O" gauge, wants to build a little 0-6-0 tank engine similar to the $3 1/2$ -in. "Molly," with two cylinders $1/2$ in. bore and $1/2$ in. stroke, and a locomotive-type boiler $3 1/2$ in. overall length, 1 in. diameter barrel, and a firebox $1 1/2$ in. long and $13/16$ in. wide over the outside of wrapper. He wants to know if the boiler will steam the cylinders if fired with a two-wick spirit lamp. He proposes to use two tubes only, the superheater element being in one of them. Rather different from the boilers we have just been talking about—from one extreme to the other!

I'm sorry to disappoint him, but I am afraid he is going to be mighty unlucky. With, say, $1/8$ -in. water spaces and $1/32$ -in. firebox and wrapper sheets, the grate will be only $7/16$ in. wide; if he could keep a little charcoal fire burning on it, in a state of incandescence, the weeny boiler would make the steam. But I



Blast pipes for inside cylinders

don't think he will do it with a spirit lamp, because there isn't enough headroom available over the burners, for one thing; another is that the blast wouldn't pull enough air through to support complete combustion of the spirit. Also, even if it did manage to steam, the water capacity is so small that constant refilling would be needed. The only way to make a successful "O"-gauge 0-6-0 tank engine, is to follow the instructions given in these notes for "Mollyette."

A Locomotive Fire Door

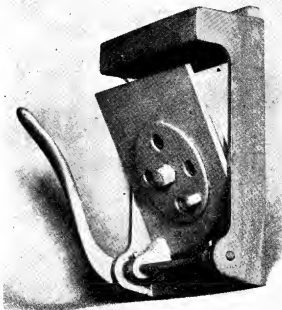
by H.J.H.

IT is often alleged that no fire-hole door is perfect, and for this reason, the design of the component needs more than ordinary care.

For small locomotive fireboxes, the oven-door type of closing member is used, as it readily allows small pieces of coal to fall clear and ensure the closing of the door. On the larger miniature locomotives, it is possible to consider the provision of other forms of door, provided they do not obstruct the view of the fire, from the driving position. Obviously, a door hinged at the top, unless opening inwards would not satisfy this stipulation. A "butterfly" door, or a door with a sliding top track only is feasible, but none too easy to operate when the engine is in motion.

Matters can be eased considerably, if a long operating lever be employed and gravity utilised to assist both the opening and the closing of the door. The handle of the door illustrated can be manipulated by either hand or shovel. As the hinge-pin is well forward, the weight of the door-sheet and protector-plate disturb the balance so that the door remains closed; or, when open, the top of the handle rests on the footplate. Hence, firing is practicable with a reasonable feeling of stability and safety.

As the door is gravity-controlled, a latch and sector would have been needed for it to be left partially open for the admittance of "top air" to the fire. Instead, air-holes pierce the door sheet and a rotating plate with similar openings is provided to adjust the air flow. Incoming air meets the protector-plate, to be warmed by it, before being spread over the fire by the deflector. The deflector is easily renewable, and its provision tends toward complete combustion of the firebox gases. At the same time, it prevents cold air passing direct to the tube ends, which might otherwise contract and cause leaks. This, by the way, is not likely to happen when tubes are



A fire door for a 7½-in. gauge locomotive

silver-soldered into the tube-plates.

The door assembly illustrated was constructed of steel to suit a fire-hole opening of 2½ in. width and 2½ in. depth. The side-members after being cut to shape and drilled, were pinned to cross-members at the top and bottom. A suitably-cut piece of angle-steel forms the remainder of the kettle-tray, and after its insertion, the whole was brazed up.

The door sheet which laps the fire-hole opening was then cut to size. Next, holes were drilled in it for the air openings, stud for rotating plate, and the rivets which

hold the protector plate *in situ*. Following this, the protector-plate was cut to shape and holes drilled in it to correspond with the rivet holes in the door sheet. Lugs were then made and brazed to the lower edge of the door sheet.

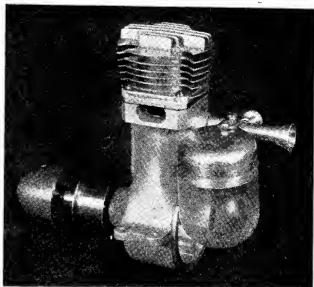
Tubular members surround the rivets to space the protector-plate from the door sheet. After these were fitted, the stud for the rotating plate was screwed into position. To facilitate the movement of the rotating plate, a stud was furnished near its edge. Then, the rotating plate was placed around its stud and loaded with a "double-turn" spring washer held by the securing-nut. A round-section hinge-pin was passed through the sides of the framing and door sheet lugs, and detachably fastened to the latter with taper pins. Finally, the operating lever, which once formed part of a bicycle brake, was pinned to the projecting portion of the hinge-pin.

The assembly is suspended upon bronze screws which pass through the upper cross-member and into the boiler backplate. These screws also support an integral extension of the peak-form deflector plate, which is sandwiched between the assembly and the backplate.

Readers will understand that the door and its appurtenances are painted with fire-resisting black before fixing in position.

A Miniature Two-Stroke Diesel Engine

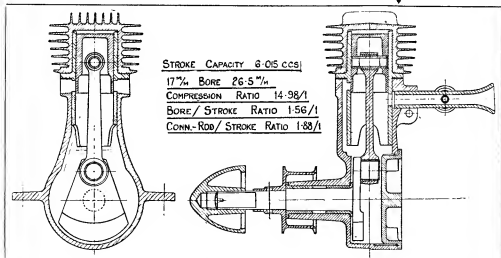
by T. Brown

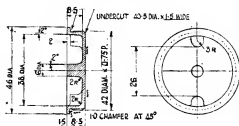
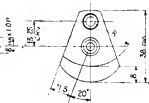


THIS engine is an air-cooled single-cylinder two-stroke diesel of 6.015 c.c. capacity, designed to run on a fifty-fifty mixture of methylated ether and diesel oil. The total weight of the engine is only 9½ oz., and its size and general proportions can be judged from the accompanying photograph and drawings. Overall, the length of the engine is 6 in., the width and the height 4½ in. With a stroke of 26.5 mm. and a cylinder bore diameter of 17 mm., the compression ratio is fixed at 15 : 1, which in conjunction with the volatile nature of the fuel employed, makes starting a simple matter.

Magnesium alloy is used for the crankcase, which is proportioned to give rigid support to the cylinder and crankshaft. A stoutly-webbed boss

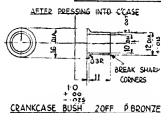
is cast integrally with the crankcase to accommodate the crankshaft bearings. These are flange-type bearings, two in number, made of phosphor bronze and pressed into the crankcase. The generous length of this dual bearing makes it adequate to withstand the overhang loading imposed on the crankshaft by the piston effort and the propeller which it drives. End thrust from the propeller is taken by the bearing flanges. The single-throw crankshaft which is made of 40 per cent. carbon steel, incorporates a counter-balance web, so that the complete rotating unit can be accurately balanced. The weight of the shaft is reduced to a minimum by the provision of two lightening holes drilled concentrically with the main journal, and the forward end





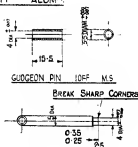
PROPELLOR FLANGE 10FF - STEEL

CRANKCASE COVER 10FF - ALUMN

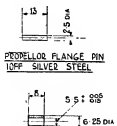


PISTON - 10FF - STEEL

CRANKCASE BUSH 2OFF P BRONZE

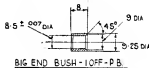


GUDGEON PIN PAD - 2 OFF-P.B.



SAWOUT 0.75 WIDE

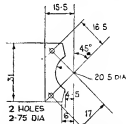
SMALL END BUSH
LOFF P.BRONZE



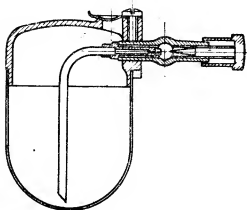
BIG END BUSH - 1 OFF - P.B.



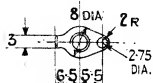
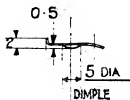
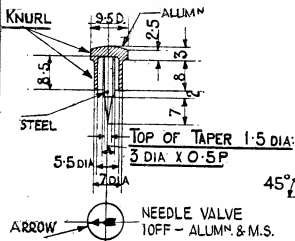
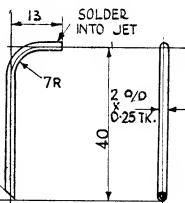
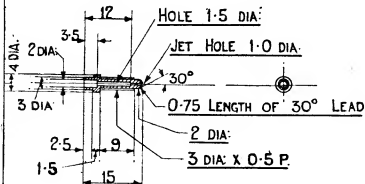
CRANKCASE COVER JOINT
10FF - PAPER .125 THICK



CYLINDER FOOT WASHER
2 OFF - FIBRE 0.3 THICK



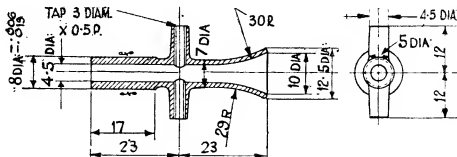
FUEL CONTAINER & CARBURETTOR

FILLER CAP
1 OFF - BRASSNEEDLE VALVE
1 OFF - ALUMN. & M.S.PIPE - 1 OFF
BRASS OR COPPER TUBECARBURETTOR JET - 1 OFF
BRASS3 DIA.
0.3 THICK
FILLER CAP
RING
1 OFF - STEEL

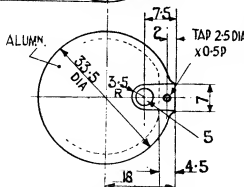
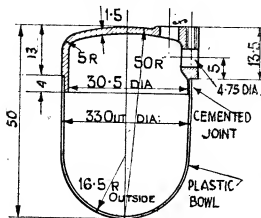
is threaded to receive the streamline spinner.

Spigoted into the crankcase is a case-hardened steel cylinder. The outside diameter of this cylinder in turn forms a spigot for the aluminium cylinder-head which is secured to the crankcase by four screws. Full advantage has been taken of the exterior of the cylinder-head surface, to provide a skilful system of deep cooling-fins in order to obtain adequate heat dissipation.

The combustion chamber formed by the crown of the piston and the interior of the cylinder-head, is of cylindrical shape. Various-shaped holes are machined in the cylinder to serve as exhaust ports, inlet and transfer ports. There are two exhaust ports which communicate direct to atmosphere through corresponding holes in the crankcase. The inlet port in the cylinder communicates with the carburettor tube,



CARBURETTOR BODY 1 OFF ALUMINIUM CASTING



FUEL CONTAINER 1 OFF
ALUM. & PLASTIC

whilst the transfer port coincides with a corresponding passage in the crankcase. Sealing the crankcase is an aluminium cover which is screwed into position, the crankcase volume being kept to a minimum in order to obtain the requisite degree of crankcase pressure, and effect an efficient transfer of the working medium to the combustion chamber during the operating cycle.

The hardened steel piston has a plain skirt and is fitted with a fully floating gudgeon-pin containing phosphor bronze end-pads to prevent damage to the cylinder walls. Prevention of gas leakage past the piston is dependent upon the fit of the piston in the cylinder bore. For this reason these two components are finally lapped so that a perfect finish and fit are obtained. The connecting-rod is fabricated of a 30 per cent. carbon steel and provided with phosphor-bronze bearings for the big-end and gudgeon-pin.

An aluminium carburettor spigots into the crankcase to register with the inlet port. Attached to the carburettor body is a transparent float-chamber into which dips a small copper feed-tube. Fuel is drawn into this pipe past a tapered metering-valve and through the carburettor to the engine cylinder. A fine screw-thread provides extremely sensitive adjustment of the tapered metering-valve and thus controls fuel consumption and the engine speed. The capacity of the float chamber is 25 c.c.

To assist in starting, a steel flange is keyed to the crankshaft behind the propeller boss and is in the form of a drum to accommodate a length of string. This flange also serves as a flywheel, imparting smoothness to the engine performance.

Lubrication of the engine is assured by the use of diesel oil in the fuel, which quickly penetrates to all working parts. Special provision is made however, for the big-end bearings in the form of two oil-holes drilled angularly to break out at the bearing surface.

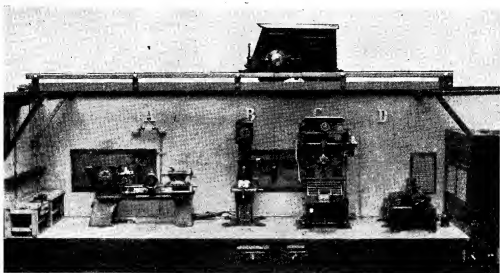
A WORKING MODEL WORKSHOP

by R. F. Hillman

THE model shown was completed in approximately three months and cost only a small amount of cash, plus a lot of work.

The workshop itself is approximately 4 ft. long, 10 in. high and 12 in. deep, being con-

10 in. long and is quite a sturdy job. The motor is from bombsight computer, having a three-pin chuck and a running centre. The bed is fabricated from $\frac{1}{8}$ in. \times $\frac{1}{8}$ in. strip screwed to a duralumin base, and the body is built up of sheet



The complete model workshop, showing "office" on the right—bench, vice and shelf on left

structed of a wooden frame, which is seen as a base in the photograph, and hides all the "wires and strings." The walls are of asbestos sheet, $\frac{3}{16}$ in. thick, with angle-bound edges. To describe the workshop: on the left is a bench with shelf over and drawer under, which houses sundry tools, and on the right is the "Foreman's office," which contains a transformer and rectifier in the rear and a "control panel" with four trip switches showing just inside the door. The little gadget to the left of this "office" is a small red warning light—just to remind one that the "juice" is on—or off!

A travelling crane runs the length of the workshop, the rails being supported by brackets. It is constructed in one unit, having push-in contacts at one end which can be removed with ease when the machines are being used.

Before describing the machines and the crane I should like to make it clear that the whole outfit was constructed entirely from war surplus, the main sources of supply being parts from bombsight computer, camera control and a few odds and ends from other surplus gadgets.

Practically no machining was needed and, as already mentioned, the cost was quite small.

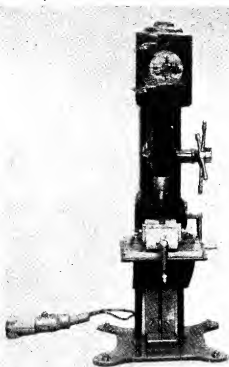
The lathe, which is capable of turning $\frac{1}{8}$ in. diameter dowelling (which, when painted with aluminium, looks quite good!) is approximately

steel 0.031 in. thick and soldered-up at edges. Another bit of the computer is used for the lead screw, and the saddle and cross-slide were almost ready-made, this last being quite manageable from 40 t.p.i.

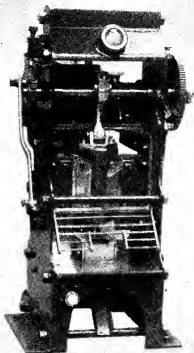
The drilling machine was constructed with the motor from a camera control mounted at the head of the machine working direct from a squared spindle, having approximately 1 in. movement into a running bush, the feed being spring-loaded. The table can be raised or lowered and, as can clearly be seen in the photograph, the handle (another computer part—almost ready-made) is also adjustable— $\frac{3}{32}$ in. holes are about the maximum.

The press was certainly a bit of a job, both in designing and constructing, and I spent many hours gazing at the real thing and almost giving up hope. However, the camera control again supplied the motor, and gears were obtained from the good old computer. The result is capable of pressing blanks (hard brass 0.003 in. thick). The photograph does more to describe this machine than solid print. It is a pity it does not show the "solenoid" which draws the pawl to operate, but the friction brake for the spindle can clearly be seen. The small knob on the left is the solenoid switch, and woe betide the operator

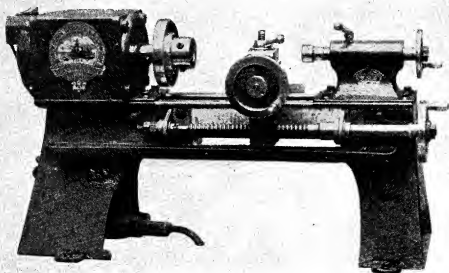
(Continued on page 26)



The model drilling machine, with adjustable table and vice



The model geared power press, with working guard



The model lathe, with three pin chuck and running centre

For the Bookshelf

Modelled Architecture, by P. R. Wickham.
(London: Percival Marshall & Co. Ltd.)
161 pages, size 6 in. by 9 in. Illustrated.
Price 12s. 6d. net.

The contents of this fascinating book, while primarily intended to be of service to model-makers, can scarcely fail to appeal strongly to all who take an interest in architecture, particularly those who are studying the subject. The text is well-written and essentially informative and practical, and the author frequently puts forward an ingenious suggestion for overcoming a constructional difficulty. The illustrations show plenty of evidence of the author's skill as a draughtsman and artist; they are largely self-explanatory and frequently charming in effect, particularly in the section dealing with Tudor buildings. The production is worthy of the subject, and we do not hesitate to recommend the book.

Metal Cutting Tools, by P. S. Houghton.
(London: Chapman & Hall Ltd., 37, Essex Street, W.C.2.) Price 25s. net.

Engineering production is very largely dependent upon the use of cutting tools, the variety of which is constantly being increased with the development of new types of machine tools and processes. Many of these have become necessary to deal with increasing rates of production, or advances in metallurgical science, but it is interesting to observe that the older tools are not rendered obsolete, though their method of application, and also their design, are constantly being improved. This book deals comprehensively with

all types of cutting tools, including single-point lathe tools, rotary cutters, such as drills, reamers and milling cutters, screw-cutting tools, hobs and broaches, files, saws, chisels and shears; in all cases describing their most up-to-date design and use. In the latter part of the book, the materials used for cutting tools, methods of heat treatment, and tool grinding are dealt with, also coolants, cutting speeds, negative rake cutters and horse-power of machine tools. The illustrations are mostly in line, and number over 250 in all. An extremely useful book to all practical engineers and toolmakers.

Introduction to Television, by A. Folwell.
(London: Chapman & Hall Ltd., 37, Essex Street, W.C.2.) Price 9s. 6d. net.

As its name implies, this book is intended principally for the beginner who wishes to obtain a fundamental knowledge of television. It is assumed that the reader already has some knowledge of the principles of radio and the design of broadcast sound receivers. From this point, it deals with the basic elements of television apparatus, including the cathode ray tube, scanning, time bases and synchronisation, and then proceeds to describe in greater detail the design and the individual functions of the various components of the system. The book is written in a lucid style, and the illustrations, mostly in line, are easy to understand, but the opinion is expressed that more of them would have been an advantage from the point of view of the type of reader for which the book is apparently intended.

"Rejuvenating Grandpa"

(Continued from page 9)

"Improving" Antique Clocks

When the renovation of an old clock is undertaken by an enthusiastic craftsman, there is often the temptation to modify or improve upon some of the details, and the question arises just to what extent this may be legitimately indulged in without destroying the character or identity of the original. From the archaeological aspect, no interference with the least detail of design can be tolerated in any specimen which is likely to have historical value, and even in quite small items, any attempt to modify may result in perpetrating an anachronism, notwithstanding though it may result in a genuine improvement in timekeeping or mechanical quality. There are, of course, many clocks, both ancient and modern, which have no claim to being regarded as typical historical specimens, and still more in which almost any modification would be an improvement and the restorer may well be given *carte blanche* to alter or rebuild any part of them. But in the case of a fairly good hand-made clock, there are sound reasons for preserving as much of the original workmanship as possible, and only replace such parts as are absolutely necessary, with copies which are of the same character, if not identical in design.

The owner of any clock is obviously free to do whatever he likes with it, but there are many clock lovers who regard with horror the replacement of a genuine old clock movement, however outworn, with a mass-produced modern movement—or worse still, a synchronous electric movement. In one or two cases, the crime has been rendered yet more heinous by providing the clock with a "synthetic" tick! The condemnation of this form of vandalism does not imply that either mass-produced clocks or synchronous clocks are bad in themselves; they are quite efficient and highly suitable for modern requirements, but entirely out of place in genuine or even pseudo-antique cases, masquerading as "period" furniture. From the practical point of view, there is no valid excuse for this sort of thing; the worthwhile specimens of old clocks may be badly worn, but they are nearly always capable of repair, and well worth repairing. Let us, as model engineers and lovers of craftsmanship, do what we can to restore and maintain these worthy monuments of the great craftsmen of old, on the foundation of whose skill, ingenuity and patience the entire structure of modern precision engineering has been reared.

Soft-Soldering and the Model Engineer

by J. W. Tomlinson

IT is remarkable how many model engineers who are quite good at anything from mathematics to machining, fall down when it comes to a bit of soft-soldering. In nine cases out of ten it is because they fail to observe the simple fundamentals such as correct preparation, the right equipment and the right temperature.

Equipment

The type of equipment used is important. Nobody can do the best work with the wrong tools. Although the old type of fire-heated iron was quite good enough for the old type of craftsman, a well-made electric iron is the most suitable tool for the up-to-date model-maker. The size of the iron will, of course, vary according to the work, but for most model making the 65-watt, 9½-oz. iron is quite heavy enough, and for fine work

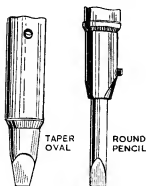


Fig. 1. Suitable types of bits

the small pencil-bit should be used (see Fig. 1).

A bunsen burner and a small blow-pipe are most essential, as quite a few jobs are better done without using the iron, as will be seen later. A typical layout for the model engineer's soldering outfit is shown in Fig. 2. If one has to choose between a bunsen burner or a blow-pipe the latter should be selected, as there are some jobs

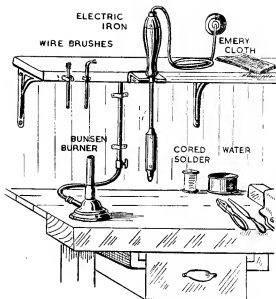


Fig. 2. The model engineers' soldering corner

which cannot be done with a bunsen burner, whereas the blow-pipe can be clamped in the vice and used as a burner.

Best Kind of Solder

The wrong kind of solder can cause a lot of trouble, and it is folly to buy solder cheap and expect it to be good. For instance, plumbers'

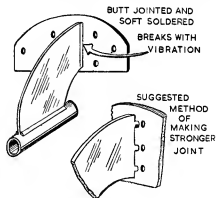


Fig. 3. Bad design causes failure

solder is no good for model soldering, it has too much lead in it. A good way to test a stick of solder is to bend it while holding it to the ear; if it crackles, it is good quality. The writer, who has had many years of soldering experience using all kinds of solders and fluxes, strongly recommends the use of cored solders for model work. Ersin multicore solder is exceptionally

good and can be obtained in handy sixpenny cartons. No additional flux is needed when using this multicore solder, and the extra active non-corrosive flux used in the three cores ensures a perfect joint.

Solderable Metals

While some metals are more difficult to solder than others, this should not greatly trouble the

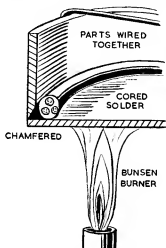


Fig. 4. Suggested method of soldering bottom to tank

model engineer as he will be dealing chiefly with brass, copper, tin-plate and mild-steel. These metals are the easiest to solder and the resinous fluxes used in multicore solder will give quite enough "bite." When these easy metals have been mastered, the more difficult ones such as stainless steel, cast-iron, and phosphor-bronze, can be tackled. These will require special methods for tinning, using special fluxes. When they are once tinned, they can be joined together in the usual way using cored solder.

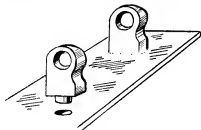


Fig. 5. Method of fixing bearing brackets

Correct Preparation

Even when dealing with the easy metals, success depends greatly on the way the work is prepared. There is no secret about soldering and it does not require any special skill. Once the model maker realises that all he has to do is stick to the rules, he becomes an expert at solder-

ing. We all know that cleanliness is of paramount importance, but what does it mean? First, it means that the iron face must be perfectly tinned. It is no use just tinning the point, there must be ample working area of tinned surface, and if this should become overheated at any time, burning the tin, the burnt tin should be filed off and the bit re-tinned. When tinning the bit, only the portion to be tinned should be filed, thus retaining the anti-corrosive finish on the un-tinned part. If an electric iron is left switched on, though not in use, it should be placed so that the bit rests on some metal surface, in order to dissipate the heat. This will prevent the burning of the tinned surface and also prolong the life of the iron. At times, oxide will form on the tinned surface, and should always be removed by drawing the iron quickly across a damp cloth before contacting the work-piece.

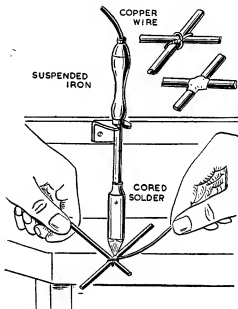


Fig. 6. Using copper wire to strengthen joint

Any form of grease or swarf on the surfaces to be tinned will spoil the job. These surfaces should be filed, wire-brushed or polished with emery-cloth until there is not a spot of rust or stain to be seen, and the cleaning should extend over an area of at least 50 per cent. larger than that to be tinned. The prepared surfaces must not be fingered and they should be tinned as soon as possible after cleaning.

Why a Flux is Necessary

All metals possess surface oxides, and it is necessary to remove this oxide prior to soldering, and also to prevent it forming whilst the metals are being heated. For all joints a flux should be used, which, while being active enough to remove the surface oxides, does not leave any excessive deposits, which will afterwards corrode the metals which have been joined. When dealing with

electrical equipment it is further necessary to ensure that the flux has a high insulation value and will not be of a greasy nature. For many years rosin has been used as a non-corroding flux. However, rosin in its normal state is very inactive and is only really satisfactory when used on the "easy metals" which have been scrupulously cleaned just prior to soldering. Modern flux as is used in multicore solder is made of pure rosin to which has been added a small percentage

bigger area of contact, and one way of doing this is shown in the illustration.

Practical Examples

Soft-soldered joints should never be butted when there is any stress. For tanks and similar vessels where a butt joint may be used, this can be strengthened by chamfering as shown in Fig. 4. Model brackets which have to carry line shafts or spindles, should never be soldered straight

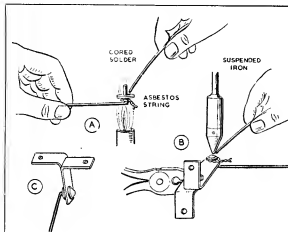


Fig. 7. Method of fixing elevator control-rod

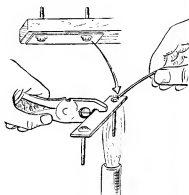


Fig. 8. Soldering engine-bearing bolts

of activating agent, which is entirely dispersed during the soldering operation, eliminating all risk of corrosion and at the same time giving as good results as if an acid flux was used.

Tinning

Although when using multicore solder it is not always necessary to pre-tin the parts, it is recommended where overlapping, or when the parts fit one into the other, as with pipe unions, that pre-tinning should be employed. When it is possible, the best way to tin small parts is, after cleaning, to hold them over the bunsen burner and when the correct temperature is reached, apply the cored solder. It is important that the parts are heated to the right temperature, so that when the solder is applied there is an easy flow all over the prepared surface. Before the solder has set the parts should be shaken to remove any surplus.

Design the Cause of Failure

The design of the parts has a direct bearing on the success of the job. Where stressed parts are joined, or where they are made subject to excessive vibration, it is expecting too much to rely on a soft-soldered joint, however well it is carried out. For instance, a propeller shaft tube support on a model power boat was butt-jointed and soft-soldered to the backplate as shown in Fig. 3. This resulted in frequent breakages, no matter how well the job was done. Now this was a case of bad design, and not bad soldering. The answer in this instance was to provide a

on to a flat surface. A much stronger joint can be made if a pip is left on the bracket and the mating surface drilled, see Fig. 5. The two parts are then tinned, fitted together, held over the burner, and just when the right temperature is reached, a touch of cored solder will cause the metal to run all round the base of the bracket making a perfect joint.

It may happen that two tubes or wires have to be joined. Quite a strong joint can be made by wiring the parts together with copper wire, holding over the burner, and applying the solder. This is one instance when pre-tinning is not really necessary when multicore solder is being used, see Fig. 6.

Dealing with model aircraft, it is usual to fix the elevator control-rod to its bracket by means of washers soldered to the rod. A good way of fixing these accurately is shown in Fig. 7. First, a piece of asbestos string is tied round the bracket end of the control rod, a suitable washer is then slipped in position and the assembly held over the burner. At the right temperature, cored solder is applied, this running through the washer and forming a fillet supported by the asbestos string. When the solder has set, the rod is fitted through the bracket and asbestos string tied round the rod. Another washer is fitted and the assembly is held up to the suspended electric soldering iron and solder applied. When the solder is set, the string is removed giving a nice working clearance for the control rod.

Model aero engine bearer bolts are generally sweated to the engine plates with soft solder

to prevent them turning. This is one of the easiest jobs. The plates and bolts should be cleaned with emery-cloth, the bolts fitted in position, and held over the bunsen burner, and when the parts have reached the right temperature, cored solder applied. See Fig. 8.

For sweating unions to pipes, the best way is to pre-tin the mating surfaces, fit the parts together and arrange as shown in Fig. 9. Then, using a blow-pipe, heat the parts until it is seen that the solder is running; finish by adding a little cored solder.

Soft-soldering Aluminium

Quite a lot has been said about soft-soldering aluminium, but there are still some people who

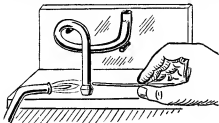


Fig. 9. Sweating on a pipe union

do not know whether or not it can be done. It can, but as the technique is not sufficiently advanced to warrant its general application, it is suggested that the process is used more or less for experimental work.

The usual method of application is to hold the part to be soldered over a bunsen burner, until it is heated sufficiently to obtain a ball of molten solder from the stick on to the work-piece, see Fig. 10. A special solder should be used, made up of 85 per cent. tin and 15 per cent. zinc. With a hacksaw blade ground to give a sharp edge, scratch the surface of the work-piece under the molten solder, working from the centre and spreading outwards until the required area is tinned. This action will break through the film of oxide, thus ensuring a good adhesion. When both mating faces are tinned, they should be pressed together and heat applied. When it is not possible to press the parts together, quite a strong joint can be made by building up with cored solder after the aluminium has been tinned

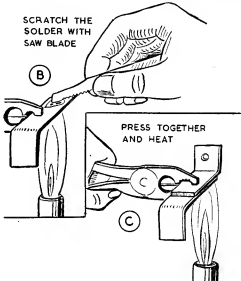
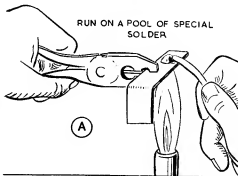


Fig. 10. Soft-soldering aluminium

by the friction and special solder method. The use of flux is not recommended for ordinary model work as this will cause excessive corrosion if trapped between the parts. In every case the parts should be thoroughly washed in water and given a coat of zinc chromate primer followed by a coat of good varnish paint in the desired colour.

A Working Model Workshop

(Continued from page 20)

who doesn't let go soon enough—two bumps instead of one!

The power saw on the extreme right of photograph completes the machinery. This saw, being geared down, works slowly, and takes quite a "scale" time in sawing off; again the materials used was a camera motor and some more computer parts.

The overhead crane is constructed from a shutter motor which has a very slow movement, and (joy was ours) it reverses.

Wipe contacts are used to drive, and a dog clutch does the up-and-down and back-and-for business.

All the machines were painted battleship grey and gay transfers were used until the supply ran out.

PRACTICAL LETTERS

Willans Steam Engines

DEAR SIR,—In common with a number of other readers, no doubt, I was very interested in the compound Willans engine, illustrated in your issue for November 11th. It is a great pity that there seems to be no information as to its performance or even a photograph of it, as made. It is an extremely clever design, but I rather doubt whether it would be suitable for a steam bicycle. There would always be losses by slip

piston B¹. The steam is cut off at a certain point of the stroke of the piston, and for the remainder of the stroke acts expansively.

"On the return stroke of the piston—say B¹¹¹—towards the top of the cylinder, the lower port (G) in the side of the cylinder is uncovered to allow the steam to pass back out of the cylinder A into the casing H surrounding the crankshaft C.

"The reversing-valve is very simple and is one of the most important features of the engine.

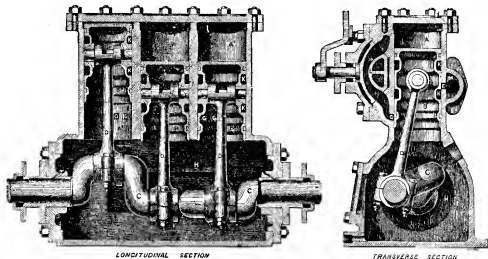


Fig. 1. Willans patent three-cylinder engine

of h.p. steam past the tail-rod and piston slide-valve. Apart from slip, there is always the danger of piston-valve seizure with very highly superheated steam. However, before interest in the Willans engines dies away, I thought that readers might be interested in the Willans three-cylinder S.A. engine, as illustrated in Messrs. Tange & Holman's catalogue for 1876. Fig. 1 gives sectional views of the engine and below is Tange's description of the engine.

"The three cylinders (A.A.A.) are placed side by side, the pistons (B.B.B.) work on to three cranks on the main shaft C at angles of 120 deg.

"Each piston acts as a steam valve by means of which the steam is supplied to one of the other pistons. Around each piston is formed a wide and deep groove, the space between which and the side of the cylinder is supplied with steam from the boiler, through the ports (E.E.E.) in the side of the cylinder. When either of the pistons—say B¹¹¹—is at about five-eighths of its stroke towards the crankshaft, the lower edge of its steam-supplied groove K overlaps at port (G) formed in the side of its cylinder and permits steam to pass through this port to the top of one of the adjoining cylinders (A), there to drive the

The steam, after it has passed from the piston-groove through the lower port of one cylinder, can be directed at pleasure, by means of this valve to either of the other two cylinders and the direction of the rotation of the crankshaft will be forward or backward, according to the direction given to the steam by this valve¹¹.

If the engine is not required to be reversing, only one groove K is required. The engine is, in fact, as nearly valveless as a steam engine can be.

A feature that may be criticised is that the exhaust steam was passed through the crankcase so that the only lubrication that the big-ends could get was from the water in the condensed steam. It is, however, true that other engines of the period had the same feature and I have also heard of an enclosed compound steam engine being run with water in the crankcase, without any dire results.

Illustrations in the catalogue show this engine (1) Fitted to a ship's steam winch. A design that appears far in advance of the old open twin-cylinder type.

(2) Connected direct to a drum for whipping up sacks of light material.

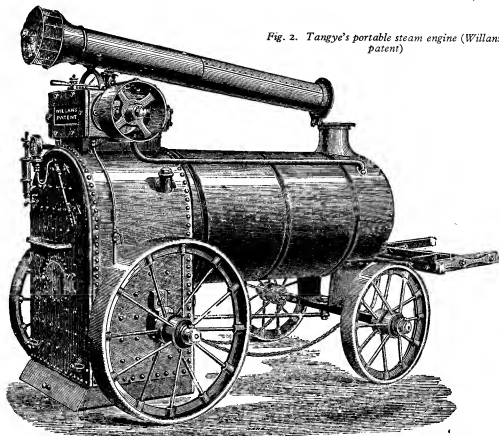


Fig. 2. Tangye's portable steam engine (Willans patent)

(3) Connected to a vertical boiler for various stationary purposes.

(4) As the portable steam engine, shown in Fig. 2.

Why this engine with so many admirable features faded out I do not understand. Perhaps in those days there was a good quantity of steam lost past the pistons and their valve portions. The absence of any cylinder-head drains or spring relief-valves will be noted. As it was claimed that the engine could be driven by any unskilled person, there must have been some fearful water hammering when that individual started it up from cold. The smallest size engine listed was 1 h.p. nominal, with 3-in. by 4-in. cylinders at £25, and the biggest was rated at 24 h.p. with 10-in. by 12-in. cylinders, price £180. The nominal h.p. was developed at 30 lb. per sq. in. but the engine could be run up to 100 lb.

Swanage.

Yours faithfully,

H. E. RENDALL.

Electric Clocks

DEAR SIR,—Mr. Stead's article in a recent issue of THE MODEL ENGINEER brings a hazy recollection of the description in a technical journal, some years ago, of what was described as a gearless electric clock. Three concentric

staffs were driven by rotors having poles in suitable ratio. Two of them, if I remember correctly, were magnetically "geared" to the next shaft by means of appropriate numbers of pole-pieces. The idea is difficult to describe in a few words, but I trust you will gather what is meant.

As the idea seems to have passed into oblivion, it may be that although in theory the clock was possible, it was not a practicable proposition.

Best wishes to staff and contributors of your happy little journal, and a specially warm "thank you" for "L.B.S.C."

Yours faithfully,

ARTHUR H. PALMER.

West Molesey.

Hot-air Engines

DEAR SIR,—I read with great interest the article "A Successful Hot-air Engine" by V. H. Messer, of Australia. His efforts are worthy of praise, as anyone who has attempted to design and construct prime movers with practically no data available will agree.

Some years ago I had similar troubles with a $\frac{7}{8}$ in. bore job. After much thought and "fiddling" I did achieve my aim and had learned much from the experience. I've been glad many times that it didn't run continuously

as first designed, for I might never have gained that knowledge which has enabled me to design and construct many continuous runners, having considerable power and efficiencies better than those of their full-size brothers.

If your contributor would furnish details

of dimensions and materials employed in his engine, I believe I can assist him. Again, I shall be glad to assist any readers interested in this type of prime mover.

Yours faithfully,
Hailsham. R. T. A. BROWN, A.M.Inst.B.E.

CLUB ANNOUNCEMENTS

Ickenham and Ruislip Model Club

Four new members were enrolled at our meeting on December 17th. A prospective member showed drawings of a jet-propelled model aircraft on which he is working and expressed willingness to instruct others where interested. We are nearing the final completion of details of our new headquarters with the use of a workshop and an announcement of their opening will be made in the near future.

Hon. Secretary: H. C. PIGOTT, 23a, Parkfield Road, Ickenham, Uxbridge, Middx.

Romford Model Engineering Club

The meeting on Thursday, December 16th, 1948, was specially arranged for the entertainment of the exhibition helpers, and was opened with a favourable financial report from the chairman, Mr. L. R. Chilver. A complete collection of exhibition photographs and some sample lantern slides were screened from an episode in order that the whole assembly could view the pictures at one and the same time. There followed a film show featuring club members old and new, and a fine film of the Romney, Hythe and Dymchurch Railway taken and projected by member Frank Greenslade. A re-playing of the recording made for us by our Australian friends concluded a novel and enjoyable evening.

Next meetings:

Thursday, January 6th. Competition Night (when it is hoped to take some photographs of the proceedings).

Thursday, January 20th. Annual General Meeting.

Both meetings will be held at the Lambourne Hall and will commence at 8 p.m.

Hon. Secretary: C. WILKINS, The Lodge, Woodward Road, Dagenham. R.P. 2871.

Derby Society of Model and Experimental Engineers

The club room at St. Andrew's School, London Road, has now been redecorated and the heating installation greatly improved; all the work being done voluntarily by the club members.

On November 3rd Mr. Buck gave an interesting description of some old slides of railway and general interest; followed by a demonstration of glove puppetry by Mr. B. M. Smith.

We were favoured on November 17th with a visit from Mr. N. R. Chandler who gave an excellent paper on the "Early History of the Motor Car," the lecture being illustrated by about 40 slides.

Programme for January:—

January 12th. "Model Making in Industry." Mr. Campbell White.

January 26th. "Building a 1-in. Scale Traction Engine." Mr. W. M. Smith.

We shall be glad to welcome visitors to these meetings, and to hear from any who are interested in membership of the society.

Joint Hon. Secretary: W. K. WALLER, 37, Douglas Street, Derby.

Kirkcaldy Society of Model and Experimental Engineers

The monthly meeting of the society was held in the hall of the Deaf & Dumb Institute on Thursday, December 16th, and an address was given by Lieut.-Col. Sir Eric Hutcheson, Bart, of Kinross. His subject was "Some Recent Developments in Railway Modelling, and Details of Pre-grouping Railways," and a wealth of information on construction and layout was provided.

He showed some fine models of N.E.R., G.N.S.R. and H.R. locomotives, and a very entertaining and instructive evening was spent by the members, who showed their appreciation of the speaker by the number of questions asked.

Arrangements were made for further meetings and for works visits in the New Year.

Hon. Secretary: J. DALGLEISH, Broomhill Crescent, Burtland.

The Maghull and District Model Engineering and Experimental Society

A new club has been formed in the Maghull district of Lancashire with a membership, so far, of fifteen.

Prospective members will be welcome at meetings, held at Sukey's Cafe, Northway, Maghull. It is intended to run a junior section to cater for the younger element.

The Rochdale Society of Model and Experimental Engineers

The first exhibition of models and handicrafts held by the Rochdale Society of Model and Experimental Engineers and opened by their president, Councillor Bossier, proved to be an astonishing success.

The doors were open for three evenings and one day—a matter of twenty hours, during which the estimated number of ten thousand people were admitted. The crowd was so great on the Saturday afternoon that the doors had to be repeatedly closed and a queue formed up to a hundred yards long.

The club had no trouble in soliciting models which were forthcoming in numbers from neighbouring clubs, viz.:—Bolton, Manchester, Oldham, Whitefield, Bury, etc.

A variation to model engineering was also provided by the following local clubs:—The Photographic Society, The Philatelic Society, The Model Flying Club and Radio Society, and a collection of tropical fish caused great interest.

The model railroad with live steam locomotives did yeoman service throughout the exhibition and many fathers have become prospective model engineers. The flying club also put on some interesting round-the-pole flying under most hazardous conditions.

The special prize for the best Rochdale exhibit was won by Mr. A. Warwick for a very fine model of a steam tug.

The club takes this opportunity of thanking all those who in any way helped to make this exhibition such a huge success and hope for their continued support in the future.

Hon. Secretary: D. WOOLFENDEN, 21, Vicarage Road, Castleton.

Glasgow Society of Model Engineers

The next meeting will be held within the society's rooms at 60, Clarendon Street, Glasgow, N.W., on Saturday, January 15th, 1949, at 7.30 p.m. K. C. McLennan has promised to speak upon "Small C.I. Engines" on which subject he is an acknowledged authority. A number of models will be on view, and demonstrations may be given in the test room, adjoining the lecture hall.

Visitors will be welcomed and particulars of membership can be had from the address below.

Secretary: JOHN W. SMITH, 785, Dumbarton Road, Glasgow, W.I.

NOTICES

All rights in this issue of "The Model Engineer" are strictly reserved. No part of the contents may be reproduced in any form without the permission of Percival Marshall & Co. Ltd.

The Editor invites correspondence and original contributions on all small power engineering and electrical subjects. All such correspondence should be addressed to the Editor (and not to individuals) at 23, Great Queen Street, London, W.C.2. Matter intended for publication should be clearly written, and should invariably bear the sender's name and address.

Readers desiring to see the Editor personally can only do so by making an appointment in advance.

All correspondence relating to sales of the paper and books to be addressed to THE SALES MANAGER, Percival Marshall & Co. Ltd., 23, Great Queen Street, London, W.C.2.

Correspondence relating to display advertisements to be addressed to THE ADVERTISING MANAGER, "The Model Engineer," 23, Great Queen Street, London, W.C.2.